

STATEMENT OF BASIS

Cherokee Nitrogen LLC
Cherokee, Alabama
Colbert County
Facility Number 701-0013

Introduction

On June 30, 2017, the Department received an application to renew the Title V Major Source Operating Permit for Cherokee Nitrogen LLC. This facility, located on the Tennessee River near the town of Cherokee, manufactures nitrogenous fertilizer products (SIC # 2873). The proposed Title V Major Source Operating Permit will be issued under provisions of ADEM Admin. Code R. 335-3-16. The applicant has requested authorization to operate the facility shown on the application on file with the Air Division of the Alabama Department of Environmental Management, in accordance with the terms and conditions of the permit.

The facility, which began under the name of Armour Agricultural Chemicals in the 1960s, was acquired in 1968 by US Steel and acquired by LaRoche in 1986. The owners name changed to LSB Industries in November 2000. The facility manufactures nitrogenous fertilizer products. The facility consists of one synthetic ammonia plant, two nitric acid plants, an ammonium nitrate plant, one urea plant, and a utility plant with two boilers. The facility is allowed to operate 8760 hours per year, unless otherwise specified. Based on the Title V permit application, Cherokee Nitrogen is a major source for the Nitrogen Oxides, Carbon Monoxide, and Volatile Organic Compounds.

Emission Units

The following is a list of all of the facility's sources (individual emissions units) which will be part of the facility's Title V Major Source Operating Permit:

Permit Unit No.	Description of Unit
001	Synthetic Ammonia Plant
002	No. 1 Nitric Acid Plant
003	No. 2 Nitric Acid Plant
004	No. 1 Ammonium Nitrate Plant Neutralization
005	Ammonium Nitrate Prilling Unit
006	97.6 MMBTU/hr Boiler
007	30,000 Gallon No. 2 Fuel Oil Storage Tank
009	2,000 Gallon Gasoline Storage Tank
010	Diesel Fired Engine for Water Pump
011	97.6 MMBTU/hr Natural Gas Fired Boiler
012	1495hp Diesel Fired Emergency Generator

Synthetic Ammonia Plant

This unit was built in 1961 and can produce 189,800 tons per year of anhydrous ammonia. Ammonia is manufactured by reacting hydrogen with nitrogen. Hydrogen is obtained by the catalytic steam reforming of natural gas and nitrogen is obtained from air. The process natural gas is desulfurized by being passed through a bed of activated carbon. The carbon beds are regenerated with steam once a week, which is vented to the atmosphere (Emission Point 001A). Desulfurized gas is mixed with steam and heated in the presence of a catalyst in a reformer fired with natural gas. The natural gas combustion emissions from the primary reformer are vented to Emission Point 001B. Carbon monoxide from the process is converted to carbon dioxide, which is then used in the urea plant or sold to an outside source. The purified gas is converted to ammonia by catalytic reaction under pressure and heat, and then cooled to condense the ammonia in the reformer. The ammonia is then used in the production of nitric acid, urea, and ammonium nitrate or sold. Other emission points in this plant are the Flash Tank 148-F (Emission Point 001C) and the CO₂ Stripper Vent (Emission Point 001D).

Emissions from the sulfur removal process (Emission Point 001A) have no limits. Potential emissions from this process are estimated to be 317 pounds per hour of CO, 1.4 pound per hour of SO₂, and 165 pounds per hour of VOCs. Emissions from the reformer (Emission Point 001B) are from the combustion of natural gas. Particulate emissions from this unit are limited to 0.12 pounds per million British Thermal Units by ADEM Admin. Code R. 335-3-4-.03. This unit has a heat input of 288.5 million BTU per hour, which would limit it to 34.6 pounds per hour. The potential particulate emissions are estimated to be 2.2 lb/hr based on AP-42 factors. Sulfur dioxide emissions are limited by ADEM Admin. Code R. 335-3-5-.01(b) to 4.0 pounds per million BTU heat input, which would limit it to 1,152 pounds per hour. The potential sulfur dioxide emissions are estimated be 0.2 pounds per hour. Opacity from this unit is also limited to 20% by ADEM Admin. Code R. 335-3-4-.01. Opacity from this unit will be monitored weekly, as it is currently. There are no limits to the nitrogen oxide, carbon monoxide, or volatile organic compound emissions from this unit.

The following Synthetic Ammonia Plant chemical manufacturing processing units (CMPUs) are subject to the requirements of 40 CFR 63, Subpart VVVVVV: The Primary Reformer, Secondary Reformer, Methanator, Low Temperature Shift Converter, and High Temperature Shift Converter. These CMPUs use catalysts containing Table 1 Metal HAPs in concentrations above the applicability threshold; however, no air emissions of Table 1 HAPs are expected. Cherokee Nitrogen is required to comply with the management practices in 40 CFR 63.11495 and the recordkeeping requirements of 40 CFR 63.11501.

Number 1 Nitric Acid Plant

The Nitric Acid Plant No. 1 produces nitric acid by the high temperature catalytic oxidation of ammonia. There are three main steps in the process: 1) ammonia catalytic oxidation, 2) nitric oxide oxidation, 3) absorption of nitrogen dioxide in water to form the nitric acid. In the process, chilled air is mixed with ammonia before being passed through a catalytic converter, where the ammonia is oxidized to nitric oxide. This process gas is then cooled and condensed and a portion of the nitric oxide reacts with oxygen to form nitrogen dioxide. The gas stream then is passed through an absorption tower where water is used to absorb the nitrogen dioxide to form the nitric acid product. The emissions from this process are primarily NO_x, CO, CO₂e and NH₃.

A series of nitrogen oxide abatement systems, a non-selective catalytic reduction (NSCR) unit and a SCR, ultimately minimize nitrogen oxide and nitrous oxide emissions.

On January 9, 2013, Cherokee Nitrogen was issued Air Permit No. 701-0013-X002 for Nitric Acid Plant No. 1. On October 29, 2013, the unit was issued Temporary Authorization to Operate. On January 16, 2014, an initial compliance test was performed on the unit. The test results indicate that the NO_x emission rate and monitors meet the specifications of Air Permit 701-0013-X002.

On May 28, 2014, Civil Action No. CIV-14-271-F (a consent decree) was finalized between LSB Industries Inc. (LSB) and the United States EPA, Department of Justice, and the states of Alabama and Oklahoma. The consent decree resolved alleged violations of the Clean Air Act with respect to emissions of nitrogen oxides. The affected facilities under LSB include Cherokee Nitrogen LLC, El Dorado Chemical Company, and Pryor Chemical Company. On March 18, 2015, the Title V Permit was modified to incorporate the requirements of the Consent Decree.

The No. 1 Nitric Acid Plant has a long term NO_x limit of 0.6 pounds per ton of 100% nitric acid produced, based on a rolling 365-day average, inclusive of startup, shutdown, and malfunction related emissions. This unit also has a short term limit of 1.0 pound per ton of 100% nitric acid produced, based on a 3-hour rolling average, exclusive of startup, shutdown, and malfunction related emissions. Production is monitored and reported quarterly. This plant is required to continuously monitor nitrogen oxide emissions, and test nitrogen oxide emissions every 12 months. There is no limit to the carbon monoxide emissions from this unit. Potential emissions of carbon monoxide are 45 tons per year. This unit is subject to the Standards of Performance for Nitric Acid Plants, 40 CFR 60 Subpart G, as required by the consent decree. This unit is subject to Compliance Assurance Monitoring (CAM) as defined in 40 CFR Part 64. The continuous NO_x monitor meets the monitoring requirements for this unit.

Number 2 Nitric Acid Plant

The chemical processes of this plant are similar to that used in the Nitric Acid Plant #1. The pollutants emitted at this unit are NO_x and CO₂e. There are no limits to the CO₂e emissions. The Nitric Acid Plant #2 was built in 1979, and moved to its current location in 1989. This plant is capable of 248,200 tons of 100% nitric acid production. This plant is subject to the Standards of Performance for Nitric Acid Plants, 40 CFR 60 subpart G, which limits NO_x emissions to 3 lbs/ton of 100% acid produced, and to 10% or less opacity. However, the facility has taken more stringent NO_x limits for this plant which were included in Air Permit 701-0013-X003 (issued July 6, 2012) requiring the use of a Selective Catalytic Reduction (SCR) unit. The plant's NO_x limits are 0.6 pounds per ton of 100% nitric acid produced, based on a rolling 365-day average, inclusive of startup, shutdown, and malfunction related emissions as well as 1.0 pound per ton of 100% nitric acid produced, based on a 3-hour rolling average, exclusive of startup, shutdown, and malfunction related emissions. These restrictions limit the potential NO_x emissions to 74.5 tons per year. Subpart G also requires continuous monitoring of nitrogen oxide emissions. Visible emissions will be monitored weekly. This unit is subject to CAM as defined in 40 CFR Part 64. The continuous NO_x monitor meets the monitoring requirements for this unit.

Number 1 Ammonium Nitrate Plant Neutralization

Nitric acid and ammonia are mixed in a neutralization operation where they react to form an aqueous ammonium nitrate (AN) solution. Emissions from this neutralization process are controlled by a scrubber under normal operations. A condenser is used primarily when maintenance is performed on the scrubber.

The pollutants emitted at this unit are PM/PM₁₀, ammonia, and nitric acid. A Sly impinjet gas scrubber is used to control PM/PM₁₀, ammonia, and nitric acid emissions. There are no limits to the ammonia and nitric acid emissions from this unit. Opacity is limited by ADEM Admin. Code R. 335-3-4-.01. The process weight curve for particulate matter emissions found in ADEM Admin. Code R. 335-3-4-.04(1) limits PM/PM₁₀ emissions to a maximum of 24.2 pounds per hour; however, Cherokee Nitrogen has requested a more stringent limit of 1.9 lb/hr based on the scrubber removal efficiency and maximum process capacity. Potential controlled emissions from this unit were calculated using a 99% removal efficiency of the scrubber, and are expected to be 8.2 TPY of PM/PM₁₀, 34.1 TPY of ammonia, and 37.9 TPY of nitric acid. The neutralizer solution shall be monitored every two hours during operation to maintain the acidity reading from -0.10 (acidic) to +0.30 (basic) to monitor the control of particulate emissions. This unit is subject to CAM. Monitoring the Ph of the neutralizer solution every two hours when the unit is operating is sufficient for CAM. The acidity of the solution is indicative of the scrubber operating in a manner as to comply with the particulate emission rates.

Ammonium Nitrate Prilling Unit

In this unit, ammonium nitrate (AN) solution concentration is increased by air and steam in evaporators. The 99% ammonium nitrate solution is mixed with magnesium oxide before the mixture flows to the prilling tower where it is processed into solid prills. The prills are then dried, cooled, and screened before being stored for shipment. Emissions for the prilling operation are from the prill tower (EP #005a), a reverse jet contact scrubber (wet scrubber, EP #005b) and a flooded elbow venturi cyclonic scrubber (dryer scrubber, EP #005c). This unit has not operated since 2003.

The pollutant emitted at this source is particulate matter. This unit is limited to 0.9 pounds of particulate per ton of production, and 149,000 tons of production in any consecutive twelve month period. This limits the particulate emissions from this unit to 67 tons per year (15.3 lb/hr). The process weight limit of ADEM Admin. Code R. 335-3-4-.04(1) would limit the unit to 23 lb/hr. Visible emissions will be monitored weekly. The current to the wet scrubber blower should be 335 amps \pm 50 amps, and the current to the dryer scrubber should be 256 amps \pm 26 amps. The current to these blowers shall be recorded every 8 hours. The dryer scrubber is subject to CAM. This amperage monitoring is sufficient for CAM since it is indicative of the scrubber operating in a manner necessary to comply with the particulate emission standard.

97.6 MMBtu/hr Boiler

The chemical reactions in the production on nitrous based fertilizer are exothermic. The heat recovered from these reactions is recovered to generate steam used in the process. Steam from the 97.6 MMBTU/hr utility boiler is primarily for start up of the production units. This boiler is fired by natural gas with No. 2 fuel oil as backup. This boiler is subject to the requirements of 40 CFR 60, Subpart Dc. As stated in 40 CFR 60.42c(d), SO₂ emissions are limited to 0.5

lb/MMBtu. When firing fuel oil, opacity is limited to 20%, except for one 6-minute period every 60 minutes not to exceed 27% opacity. Fuel oil usage for the 97.6 MMBTU/hr boiler is limited to 71,604 gallons in any consecutive 12-month period. Natural gas usage is also limited to 855 MMSCF in any consecutive 12-month period. Particulate emissions from this unit are limited to 0.18 lb/MMBtu by ADEM Admin. Code R. 335-3-4-.03; which equates to 18 lb/hr of PM/PM₁₀. Based on updated AP-42 emission factors, potential PM/PM₁₀ emissions from this boiler are 1.0 lb/hr; therefore, Cherokee Nitrogen has requested a PM/PM₁₀ emission limit of 1.0 lb/hr. The boiler is equipped with low NO_x burners. Opacity will be monitored weekly, and fuel usage will be recorded daily. The boiler has never used fuel oil.

The table below displays potential emissions from the 97.6 MMBtu/hr boiler.

Pollutant	Potential Emissions (TPY)
Particulate Matter (PM)	3.8
Nitrogen Oxides (NO _x)	17
Sulfur Dioxide (SO ₂)	2.9
Carbon Monoxide (CO)	33
Volatile Organic Compounds (VOC)	2.5

30,000 Gallon No. 2 Fuel Oil Storage Tank

The facility has a 30,000 gallon #2 fuel oil storage tank. This tank is not subject to any regulations, but it is required that records of the dimensions, capacity, and contents be kept.

2,000 Gallon Gasoline Storage Tank

This 2,000 gallon gasoline tank is used to fuel on-site vehicles and equipment. This tank is subject to 40 CFR 63, Subpart CCCCCC National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities. This tank is also subject to ADEM Admin. Code R.335-3-6-.03, "Loading and Storage of VOC." This tank is limited to a monthly throughput of 10,000 gallons.

Diesel Fired Engine for Water Pump

The facility utilizes a diesel fired engine to power a water pump for emergency fire-fighting water. This pump is also used for non-emergency situations, such as pressure washing; therefore it is classified as non-emergency. The engine was manufactured and installed in 1999, and has a maximum brake horsepower of 287 Hp. This unit is subject to 40 CFR Part 63, Subpart ZZZZ – National emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines – Area Source. This regulation requires that the unit be operated and maintained in accordance with the manufacturers emission-related written instructions, if available, or develop a maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions. The unit is also required to limit startup/idle time to 30 minutes. The opacity is limited to 20% by ADEM Admin. Code R. 335-3-4-.01, and will be

observed on a weekly basis, if the unit is operated during that week. Records will be kept of operational times and purpose, as well as the maintenance and visible emissions observations.

16.5MMBtu/hr Natural Gas Fired Boiler

Air Permit 701-0013-X011 was issued on July 6, 2012 for this boiler. The need for this new boiler came as a result of the SCR installed in the Nitric Acid Plant No. 2. The SCR requires additional steam demand which could not be accommodated with the facility's existing steam production capabilities. This boiler also provides steam to the rest of the plant when the steam demand is low enough that this boiler can provide the required amount; therefore allowing the current, larger boiler to be idled down at times. This boiler is fired by natural gas only. The boiler is subject to the New Source Performance Standard (NSPS) (40 CFR Part 60), Subpart Dc, since the boiler capacity size is greater than 10 MMBtu/hr and less than 100 MMBTU/hr and was constructed after the effective date (June 9, 1989) of the NSPS. Since this unit fires only natural gas it is subject to only the initial notification and monthly fuel recordkeeping of 40 CFR 60.48c(a) and 40 CFR 60.48c(g), respectively.

This boiler is also subject to ADEM Admin Code 335-3-4-.03(1), which limits the particulate emission rate from fuel burning equipment. This regulation limits particulate emissions to 0.40 lb/MMBtu (6.6 lb/hr), which is much greater than the potential emission rate of 0.20 lb/hr; however, Cherokee Nitrogen has requested a PM/PM₁₀ emission limit of 0.20 lb/hr.

This boiler is also subject to ADEM Admin Code 335-3-5-.01(1), which limits the Sulfur Dioxide emission rate from fuel burning equipment. This regulation limits Sulfur Dioxide emissions to 4.0 lb/MMBtu (66.0 lb/hr), which is much greater than the potential emission rate of 0.01 lb/hr; however, Cherokee Nitrogen has requested an SO₂ emission limit of 0.01 lb/hr.

The opacity is limited to 20% by ADEM Admin. Code R. 335-3-4-.01, and will be observed on a weekly basis, if the boiler is operated during that week. Records will be kept of operational times and purpose, as well as visible emissions observations.

1495 hp Diesel Fired Emergency Generator

Air Permit 701-0013-X012 was issued on August 26, 2014 for this 1495hp Tier 1 Certified Emergency Diesel-Powered Generator. The emissions from the generator are based on a maximum of 480 hours of operation per year. The emission factors for NO_x, CO, VOC, and PM used for calculating the proposed annual emissions for the generator are based on the manufacturer's guarantee that this unit meets the requirements of 40 CFR 60 Subpart IIII. The SO₂, Formaldehyde, CO₂ and Total HAPs emission factors are based on AP-42 for large stationary diesel and all stationary diesel-fired engines. The table below displays the maximum annual emissions from the emergency generator.

Pollutant	Potential Emissions (TPY)
Particulate Matter (PM)	0.4
Nitrogen Oxides (NO _x)	5.5
Sulfur Dioxide (SO ₂)	0.005
Carbon Monoxide (CO)	6.8
Volatile Organic Compounds (VOC)	0.8

This generator is subject to 40 CFR 60 Subpart IIII, New Source Performance Standards (NSPS) for Stationary Compression Ignition Internal Combustion Engines. The engine is equipped with a non-resettable hour meter. Operating hours are limited to 100 hours per year for testing and maintenance. The engine may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. As required by 40 CFR 60.4205(a), this emergency stationary CI must comply with the emission standards found in Table 1 to Subpart IIII. The emission standards for this engine are 1.3 g/kW·hr for HC, 9.2 for g/kW·hr NO_x, 11.4 g/kW·hr for CO, and 0.54 g/kW·hr for PM. Cherokee Nitrogen has provided documentation indicating that the proposed generator is certified and capable of meeting these emission standards.

This generator is also subject to 40 CFR 63 Subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants Stationary Reciprocating Internal Combustion Engines. Since the unit is a new stationary engine and Cherokee Nitrogen is an area source for HAPs, the requirements of Subpart ZZZZ will be met by complying with the requirements of 40 CFR 60 Subpart IIII. No further requirements would apply for this unit under this subpart.

The opacity is limited to 20% by ADEM Admin. Code R. 335-3-4-.01, and will be observed on a weekly basis, if the unit is operated during that week. Records will be kept of operational times and purpose, as well as the maintenance and visible emissions observations.

Recommendations

Since it appears that Cherokee Nitrogen LLC would be capable of meeting state and federal requirements, I recommend that the facility be issued the attached Major Source Operating Permit, 702-0013 pending proper notification of both the public and the EPA.



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